Crowdsourcing, Citizen Empowerment and Data Credibility: the Case of Observations.be

Crowdsourcing is today a revolutionary phenomenon changing profoundly our ways of communicating and producing. In the last few years, Crowdsourcing has known important media coverage, especially regarding its role in recent international events like the post-earthquake Haiti rescue efforts in 2010[1] and the "Arab Spring" in 2011[2]. However, crowdsourcing is becoming more ubiquitous and is mobilized in a large number of fields. This includes new practices of design based on calls for propositions and ideas from the "crowd"[3], new modes of reporting, live and from the scene of action through social media, the development of a new more qualitative cartographic tradition based on data produced individually and voluntarily by users, and a better management of catastrophic situations by putting at the disposition of citizen and institutions bottom-up produced information that could have crucial importance during and after the crisis[4]. Crowdsourcing is clearly empowering for citizens.

More dramatically, crowdsourcing is today empowering citizens to step in two arenas where he has long been marginalized: science and politics. Despite harsh critiques addressed to these arenas as elitist, they are still ontologically built as spaces of expertise where a layperson does not have his place. It is true that, for some decades now, practices of citizen science and citizen participation have brought the citizen into the "sacred" spaces of the laboratory and the government council. However, he remains in a subordinate position in no way in control of the process. With crowdsourcing we can see a restructuration of the equilibrium set between scientists', public authorities' and citizens' powers at the founding moments of the modern project. Crowdsourcing allows citizens to "produce" Nature and Society out of laboratories and government councils and without waiting the initiative – or even the consent – of scientists and politicians.

Regarding this profound undergoing revolution this article is interested in two issues. On one hand, it investigates the forms and limits of crowdsourcing-related citizen empowerment. It is less concerned by the now recognized fact that crowdsourcing is empowering, but rather focuses on the ways it does so and the architecture of the relations between citizens, scientists and institutions in this new context. On the other, it discusses the question of credibility of data produced through crowdsourcing. This question represents, in fact, the Achilles' heel that destabilizes the rise of citizen power in the face of experts and institutions. In its discussion of these two issues, the article relies on a particularly

[1] See for example Heizelman & Waters (2010) et Gao et al (2011)

[2] See for example Sutherlin (2013) Allagui & Kuebler (2011), Castells (2012) et Howard & Hussein (2013)

[3] Example: for the design of a new internet site ((Nebaling et al, 2012)

[4] This is the case with post-Katrina. Data, describing the situation of neighbourhoods and properties, produced by volunteers and mashed-up on a site was crucial for households' decision to return (Hudson-Smith et al, 2008)

interesting case study: the online platform of participatory monitoring of biodiversity in Belgium Observations.be.

1 The story of a disruption: Biodiversity, IBGE and Observations.be

In this part we will present the case of the online platform for the monitoring of the biodiversity in Belgium Observations.be. The choice of this platform comes from the fact that it shows the on-going transition in power equilibriums, but also the complexity of the relations between institutions, experts and citizens. It illustrates this complexity by staging collaborations, oppositions and interpenetrations where some actors belong to the different spheres at the same time (expert-activist, civil servant-activist..). It does so also by stressing the role of the credibility controversy as a point of rupture and divergence between those three spheres.

1.1 Biodiversity, a destabilizing theme

Far from being just a technical exercise, the management of biodiversity is also a complex political question. It touches a number of controversial issues and mobilizes many actors: common heritage of humanity, state sovereignty on their resources, rights of peasants, modes of development, precaution principle, genetic manipulation, right to pollute (Aubertin et al, 1998). These debates and controversies on issues of biodiversity are very present for some time now in scientific circles. However, since the rise of environmental and ecological movements since the 1960s and later the Brundtland report's (United Nations, 1987) position on the protection of biodiversity as a major component of sustainable development, biodiversity started to be more present in public debates.

Hence, data on habitats and species became central to the capacity of public institutions in charge of biodiversity management to elaborate action strategies and justify them, as well as to the capacity of the civil society to follow up and mobilize. From international to scientific organizations, to public institutions and civil society actors, we can see as of the 1990s an increasing interest in the development of tools allowing monitoring and database building on biodiversity (Castri et al, 1992 ; Weaver, 1995 ; Salem, 2003 ; Scholes et al, 2008 ; Buchanan et al, 2008 ; Coops et al, 2009).

In the field of nature observation and monitoring, the participation of citizens is not something new. On the contrary, as the history of science teaches us, the citizen – often called "amateur" – has long been at the centre of the development of certain natural sciences all through the 19th and 20th century. This is mainly the case in ornithology, botany and mammology (Charvolin et al, 2007). These amateurs have been pioneers, partners and competitors to scientists. The latter have indeed appropriated their legacy and integrated it in different ways in their practice. However, with the formalization of sciences, especially the development of elaborate practice and research protocols depending on complex procedures and materials inaccessible to the large public, the amateur starts to lose his place and ends up marginalized, even caricaturized.

The return of the amateur happens paradoxically with the development national and international injunctions imposing on public institutions the provision of databases on the state of biodiversity. Be it on the proper initiative of the associative sector or on the demand of public institutions totally submerged by this task, we can see the establishment of biodiversity monitoring groups in a lot of developed (Bell et al, 2008; Whitelaw et al, 2003) and developing countries (Danielsen et al, 2000). In fact, these institutions do not have the

capacity, in terms of human and financial resources – to engage by themselves in this exercise (Levrel et al, 2010). Hence, they try to rely on existing associative groups, or create themselves new participatory monitoring networks through top-down networking and structuring.

The development of citizen science (Charvolin et al, 2007; Bonney et al, 2009; Cohn, 2008) reinforces this dynamic. For twenty years now, laboratories in natural sciences are reviving the tradition of the 19th century pioneers by increasingly calling on citizens' collaboration. Hence, if some scientists have faith in technological performance and expert institutions networking to answer the lack of data on biodiversity challenge (Scholes et al, 2008; Buchanan et al, 2008), others defend an approach mostly based on the input of local communities and amateurs of nature (Cohn, 2008). This citizen science produced through cooperation between citizens and scientists has a double asset. On one hand, it allows bringing a wealth of details inaccessible or too expensive to insure by solely scientists. On the other, it brings to the local communities and amateurs networks a certain "pedagogy" for better uses and protection devices of nature.

Environmental themes, by their complexity and multi-scale nature, destabilize power structures based, since the beginning of modernity, on an understanding between the representatives of the political sphere and those of the scientific one (Latour, 1991, 1999). Monitoring of biodiversity, by the extent of the space to cover, adds to that by putting these representatives in the position where they have little choice but to call on the input of lay citizens, long marginalized. New relations emerge where the breaking line between scientist, institution and citizen spheres becomes increasingly blurred and relations of power redefined.

1.2 The IBGE : an administration that wants to open up

The institut Bruxellois de Gestion de l'Environnement (IBGE)[5] is the Brussels-Capital Region's public institution in charge, since its creation in 1989, of the administration and management of issues related to energy and environment. With the regionalisation of environmental competences in Belgium, it is in charge of research, public information and management of issues as diverse as green spaces, quality of air and water, waste, the use of energy and ground pollution. IBGE regroups a large number of departments and employs 850 persons. The department of nature management administers the question of management of biodiversity and its protection in the Brussels-Capital Region. This includes, on one hand, the production of data on the situation on biodiversity, on the other, the management, mainly of the natural reserves, in Brussels.

With the development of the European legislation on issues of environmental protection, member states are in the obligation to proceed into a regular and systematic monitoring of the state of biodiversity. With the directives on birds (1979), habitats (1992) and more recently NATURA 2000, IBGE elaborates, since 1993, strategies to build databases on biodiversity in Brussels. Each six years it must submit an exhaustive report on biodiversity to the European Commission. This process has been strengthened with Brussels-Capital Region own legislation that extended the list of species to monitor in order to include species with regional importance.

[5] Brussels Institute for Environment Management.

Despite the relatively large size of the institution, it was in no way capable to proceed alone in the development of such databases. This would have necessitated human and financial resources that are not available. Between 1993 and 1998, IBGE chose to subcontract monitoring and base its reports on specialized centres, mainly universities. It even gave the coordination of the process and the writing to the report to a university. Since 1998, IBGE has decided to take back the coordination responsibility and open more the monitoring subcontracts to specialized NGOs.

This opening up to the associative sector is due to different logics. First, there is the practical need to cover a monitoring field that kept enlarging with newer directives and that only NGOs, with their human resources, seemed capable of covering. Second, this occurred at a moment when a new generation of employees at the IBGE and elected officials became to defend a larger constructive partnership with the historical opposition that the associative sector represents in Brussels. These employees believe that a sustainable partnership is possible and it will serve a better long term management of the environment in the Region. Finally, the orientation of some ministers' cabinets close to the environmentalist associative world contributed to this dynamic.

This opening up to citizens is an important change that should be however relativized. First, it must be said that "citizens" here are a somehow particular form of associations that gravitates at the intersections of the institutional, scientific and citizen spheres. In fact, if we find certainly amateurs in these NGOs dedicated to the study and protection of particular species, they are mostly under the supervision of specialized scientists members. In other NGOs, open to larger environmental themes, solid relations can exist with political parties and universities – some of the members of the latter often being founding members of these NGOs. Second, the citizen-amateur has here a very restrictive executive role strongly framed by scientists and is in no way master of the process that, paradoxically, depends essentially on his contribution.

It is mainly at this level that the arrival of Observations.be represents a major and destabilizing change. Two figures summarize the situation. In 2010, the addition of all the databases accumulated since 1993 by the IBGE reached around 30000 entries. For the same year, and for that year alone, Observations.be has more than 65000 observation entries.

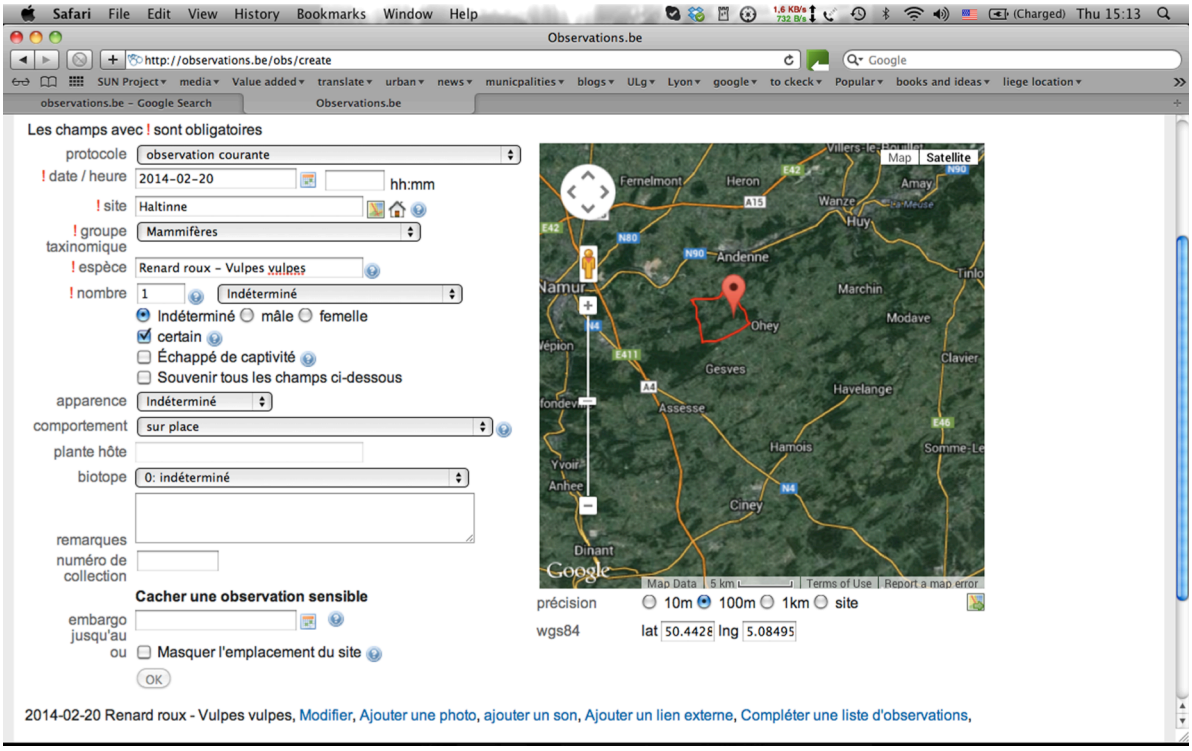
1.3 Observations.be : an earthquake in biodiversity monitoring in Belgium

Observations.be is the name of the French version of the online participatory monitoring platform of biodiversity in Belgium. It is a joint venture, created in 2008, by two nature protection NGO in Belgium: Natuurpunt (Dutch-speaking) and Natagora (French-Speaking). The platform is based on the format of Waarneming.be created in 2005 by a network of nature protection NGOs in the Netherlands. Today the Dutch site has around 22 million entries and more than 10000 registered persons, and the Belgian site has around 8 million entries and more than 5000 registered persons.

Based on a convention between the Dutch and Belgian NGOs, the sites have identical interfaces. The functionalities of the site allow the fast creation of statistics and maps by specie. The sites cover hundreds of thousands of species divided in around twenty categories (birds, mammals, reptiles, insects…). Amateurs of ornithology are the spearhead of the movement and around 65% of the entries relate to birds. Observations.be can present data in twenty languages. It has also many versions – or sub-sites – for different regions, cities or zones (e.g. parks), like bru.observations.be for Brussels.

The functioning of the site is based on crowdsourcing. It is the individual contribution of the user, in its different forms, that nurtures the site and makes it work. The user, in his entry, identifies a specie, geo-localize it on online maps. He can add photos, sound files and commentaries (see Figure 1). He can also give his opinion and propose action. Two forums exist: one in Dutch administrated by Natuurpunt and covers un large number of subjects divided in types of discussions, the other Brussels Birding Forum is focalised on birds and administrated by some Brussels volunteers.

Figure 1 – One entry in Observations.be



However, Observations.be is structured also to meet organized collective action. The existence of working groups is central to its functioning. These groups are divided by categories and sub-categories of species or by place (e.g. cities and natural reserves). Each group has its administrator who is in charge of validating each entry for it to be integrated in the database. A Projects section serves also for counting campaigns organized from time to time by some NGOs for certain species in different areas in Belgium. Finally, the existing of regional sub-sites allows local groups to have their own homepage where they can have local information and news.

Observations.be brings a reconfiguration to the relations between citizens, scientists and institutions even more profound than that imposed by the biodiversity theme.

On one hand, in the citizen sphere, the individual citizen has his own existence vis-à-vis organized NGOs. He can even use the platform beyond the basic functionalities expected from an amateur in monitoring and develop his own networks of exchange and learning. Hence, though the platform is created and administered by specific NGOs, it gives a large space for the individual citizen. It allows every person, with no link to these NGOs, to contribute. It facilitates links between citizens that do not go through any institutional framework, mainly through the forums. More importantly, it offers a space of learning on

the monitoring of different species in a practical and accessible way to any person interested. This learning that benefits from the exchanges in the forums with, among others, veterans and scientists is one of the major contributions of the platform to the citizen. The breaking line between citizen knowledge and expert knowledge, that represented historically the fracture line between their respective powers, has been greatly moved. The perspectives of action and mobilization based on the monitored data and its interpretations has been considerably widened.

On the other hand, Observations.be represents an important change in the relation between the associative sector and the public institution in charge of the management of the environment. In the last two decades we have seen a shift from a logic of marginalization of associative structures considered as incompetent to an opening up and partnership dynamic that could be explained by necessity or the injunctions of an increasingly growing participatory and democratic ethos, to, lately, a certain form of dependence where the IBGE database is largely tributary to that of associations. In fact, nowadays, the IBGE subsidizes the platform and integrates its database.

In this new landscape of monitoring based on crowdsourcing, the citizen conquest seems formidable. However, this conquest is still very fragile. Despite the acute dependency of IBGE on Observations.be for data regarding biodiversity in Brussels, it publishes its new report on nature in Brussels excluding data coming from the platform. The displayed reason: the “doubtful” credibility of this data.

2 The Loch Ness Monster of « data credibility »

In an interview with the persons in charge of biodiversity issues at the IBGE, we can see, on their part, a strong enthusiasm for Observations.be. They are themselves regular users of the platform. For them, the platform is a considerable levier for a better monitoring of biodiversity and they give it the gratifying grade of 9/10. However, we see them hesitate to adopt its data as a reference to the studies and reports they publish. Beyond their personal adhesion to the Observations.be movement, they stress that they officially represent a public institution that cannot provide reports that do not rely on solid credible data produced in the rules of science. For them, the mode of production of the platform’s data do not offer sufficient guarantee on this level. “Maybe in the future” they say.

The question of the credibility of data produced by volunteers, especially through crowdsourcing, is today a heavy debate in number of disciplines and fields that rely on observation and monitoring. Literature on citizen science and neogeography are particularly concerned by this debate. It is also in these fields that we find interesting answers to this challenge.

2.1 Data credibility in citizen science and neogeography literature

We must first say that the question of the credibility of data is today less clear than it ever was. Inexactly evaluating credibility of data could have important scientific, social, personal, educational and even political consequences (Flanagin and Mitzger, 2008). The credibility of information is traditionally given to the information produced by a person that has a history of providing reliable data, or based on the recognized – scientific or professional – status of that person. However, these basic indicators of credibility become obsolete in cyberspace (Callister, 2000).

In fact, producers of this information, especially in crowdsourcing, do not necessarily do it in the perspective of professional and scientific production. Many other reasons lead them to participate in crowdsourcing activities. These include simple fun, an enthusiasm for new technologies, emulation in a social phenomenon, the search of auto-representation, activism for a particular cause and the will to participate in the creation of a reliable product that is not a multinational copyright (Neis et al, 2012, Hudson-Smith et al, 2008, Tulloch, 2007, Boulos et al, 2011). All these reasons lead some to think that this mode of data production could be subject of serious biases and lack of necessary seriousness, undermining its scientific credibility.

On the opposite side, and in the face of this scepticism some authors show, by comparing data produced by experts and those relying on crowdsourcing, that this is largely a prejudiced position. In neogeography, Neis et al (2012) proceed to a comparative study between OpenStreetMap (OSM) and more classic cartographic systems. They show that for Germany for ezample, OSM tends to have the same coverage in terms of surface as the classic systems, but at the same time it brings 27% more qualitative and descriptive data than they do. Likewise, Levrel et al (2010), concerning participatory monitoring of biodiversity – by relying on different studies done by a number of researchers – show that the quality of the produced data does not correlate with the profile and experience of the observer but rather to other parameters. These parameters are principally linked to the existence or absence of guidebooks, the quality of the of observation tools and their methodologies, the modes of verification of protocol and the animation of the observers' networks. To decrease bias and augment the quality of data, other authors advance different technical and social devices.

Increasing the quality of Metadata can be an efficient way to reduce possibilities of confusion and errors at the level of entries (Brando and Bucher, 2010). This includes, for example, the continuous improvement of Metadata through – automatic – adaptation of classification categories, rendering them the most simple and heuristic possible. Likewise, programmes allowing the display of the IP address of an entry's author's could contribute to the credibility of data – especially for local data (Flanagin and Mitzger, 2008). Other programmes built on powerful algorithms capable of filtering "noise" and "suspect" entries in data built through crowdcasting or crowdsourcing do exist (Boulos et al, 2011, Bonner et Cooper, 2012)[6].

Beside these technical devices, the principal means to reinforce data credibility remains peers control. The more there is positive commentaries and reviews the more an entry has a chance of being credible. Likewise, edition wars in Wiki formats, where peers undertake corrections of one another's entries in the same document, is an indication of refinement in the quality of produced data. Hence, the presence of functions allowing to see the history of corrections and follow their evolution – like in Wikipedia and Google Documents – can serve to better understand the entry and corroborate or not its credibility. Besides, this mode of verification and validation by peers is capable of questioning the credibility of established sources coming from scientific expertise. This is what some authors call the "wisdom of the masses" (Madden and Fox, 2006; Boulos et al, 2011).

[6] This is the case for example of WSARE and SwiftRiver that treat data built through the "firehose" of the social Web (Boulos et al, 2011).

Another type of social devices to increase data credibility is the improvement of the technical knowledge of users (Flanagin and Mitzger, 2008; Cohn, 2008; Bonner and Cooper, 2012). Training users through online tutorials and webinars is becoming a widespread practice in number of nature observation projects in citizen sciences (Toomey, 2014).

The notion of credibility itself is also questioned reviewed and relativized. For Flanagin and Mitzger (2008) credibility is divided into two components that have different roles depending on the situation: veracity and expertise. In Information sciences, credibility is treated through its objective dimension: quality of information, degree of precision in respect to norms that are considered as acceptable by specialists in the field. Contrariwise, in psychology, credibility is dealt with through its subjective dimension, mainly the degree of acceptance by the receiver of the information. In this perspective, there is a differentiation between credibility and precision. It is not the fact that it is based on norms considered as references, from the point of view of peers that makes the information credible but the fact that the receiver believes that it is the case.

This opens the way to a reflexion on the means to reinforce credibility of data produced through crowdsourcing. This includes, for example. The consideration of heuristic elements that would increase the perceived credibility of a site and its data: the professionalism in the presentation of information, the easy navigation through the site, the absence of displayed commercial intentions (.org and .edu vs .com)[7]. Likewise, the longevity of a site and the number of its users are also source of credibility. Finally, on the individual level, the more a person uses a site the more he tends to believe it credible. This perspective puts non-experts credibility under a new light. This concerns mostly those that have a local knowledge of a phenomenon that hence might seem more "true" and source of trust than accredited experts Flanagin and Mitzger, 2008).

These different resources to understand and deal with the issue of credibility, based on citizen science and neogeography literatures, are of course relevant to the issue of crowdsourcing in the field of monitoring. In fact, as we will see in the next section, the actors of Observations.be are already mobilizing some of them.

2.2 The strategy of Observations.be for crediblizing its databases

Confronted with the position of IBGE representatives, Observations.be's administrators defend their platform by advancing arguments justifying the credibility of their databases and beyond the unquestionable input of the platform for a better understanding and management of biodiversity.

2.2.1 Justification Through technicity: protocols and « ruses »

Observations.be's administrators stress the existence of protocols and "ruses" that allow the validation of data and the bypass of certain issues and problematic situations. The validation touches here two distinct issues: the right identification of the reported specie and the credibility of the aggregated data – statistics and maps.

Concerning the first issue, for the administrators, the primary and most basic filter is the user himself. In case of doubt concerning the right identity (its specie) of the observed fauna or flora, the user can proceed in two ways. He can put the observation in different categories among which he believes the specie would be most accurately identified. He can check the

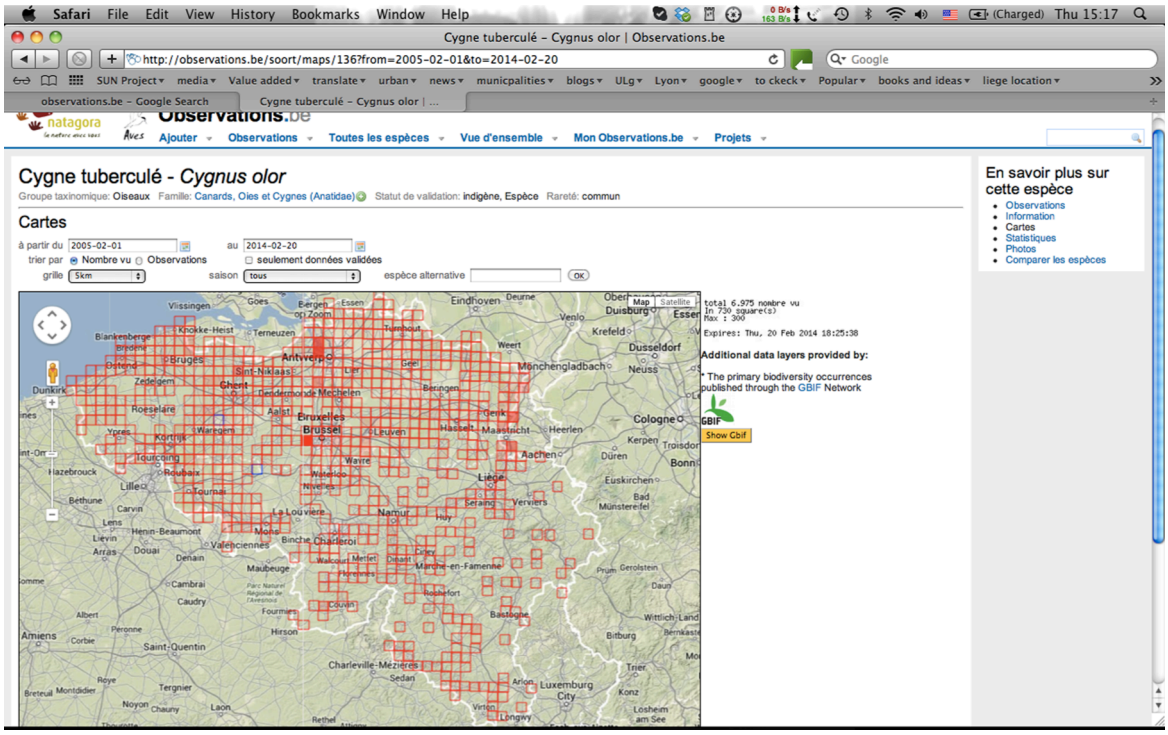
[7] The perceived motivation of the authors of the entries is important in the credibility of an information material: political and commercial agenda vs. neutrality and altruism.

category case with (?) to say he does not know exactly what it is. In these cases, the specie(s) coordinator will contact him to help him identify it. A second filter is an automatic message that pops up when the user signals rare species. The message ask him to answer a series of questions that help confirm his declaration, it asks him also – if not already done – to upload a photo backing his claim. The third filter is the specie(s) coordinator. He is usually a veteran of nature observation, sometimes even a specialist. This person has an experienced knowledge of the category of specie(s). He is in charge of validating entries. He contacts the user when he has doubts. Photos are usually a valuable mean for confirming claims, however, it is not always the case, as with some mushroom species for example. In cases of remaining doubt, the coordinator can also refer to the forums where through discussions with other users, veterans and specialists, he might be capable of taking a decision: accepting or discarding the entry.

As for the credibility of maps and statistics built on the sites' databases, we face a double challenge. On one hand, observations are not equitably distributed across territory. On the other, we can end up with a situation of multiple entries reporting the same observation.

In fact, clearly, some areas and places are better covered than others. This is the case for example between Flanders and Wallonia. In the latter, the nature monitoring movement is not as developed as in Flanders. Consequently, if a map shows a larger presence of a specie in the North of the country than in the South, that might be related to the number of observers than the true density of specie in these areas (see Figure 2). Likewise, certain areas in Brussels are more covered than others. This is the case for example of a park near the IBGE building, where a lot of the institution employees, users of the platform, take their snack in sunny days.

Figure 2 – Example of disparities in the coverage of Observations.be of Flanders and Wallonia



There is also the possibility of having multiple entries for the same plant/animal at a certain time and place. This is particularly the case when a rare and exotic animal is spotted. Social networks of nature amateurs will get us in a situation where a lot would want to take him in photo.

These questions are not particular to biodiversity monitoring and are found in neogeopgraphy. Hence, density of population or use of a place contributes to its overrepresentation. Likewise, we can find an interest for large open spaces among users of some neogeography platform and Observations.be. In fact, as stressed by Neis et al (2012) concerning OSM, users are interested in developing the covered area and reducing "Terra Incognita". The latter usually corresponds to large uninhabited areas. As for Observations.be users, we see a particular coverage of these spaces visited by a large number of users involved in tracking and other nature activities[8].

In the face of these situations, the platform's administrators try to introduce elements of rebalancing. One way is the counting campaigns. Dividing a territory in zones, and based on users and local affiliated NGOs and actors, a counting of specific specie is organized. The user participating to the campaign can signal for a certain zone he is covering the number of observed specimen, or he can say "I saw nothing to report". This allows a global cartography of the specie for a certain territory. On the other, the coordinator has the possibility to hide some observations or take them off if he believe there is some excess.

2.2.2 Justification through efficacy : a « super-site »

For the administrators, the platform does not pretend to provide a detailed global cartography of biodiversity but to show tendencies. In any case, the potentialities of the platform and its databases render the question of the scientific validity of the data marginal: "it does so much more that the scientists' tools have done that this compensates its possible weaknesses". The large number of the functions that it insures answers multiple objectives and different issues that are of interest for various actors.

First, the size of the databases is by itself a considerable asset. As shown by one IBGE employee in charge of biodiversity, in one of his presentations, through a comparison between maps of red fox presence in Brussels produced by experts and those relying on crowdsourcing, the latter are richer and more nuanced. They even allow questioning established ideas showing that the red fox is more present in the residential peripheral areas of Brussels than in the Soignes forest.

Second, the site allows a large number of functions tat can improve the capacity of action and communication of public services on certain issues. It allows for example a better management of nature: even though the databases are not necessarily representatives of the situation of biodiversity in a holistic perspective, projects of counting help create instant and rich inventories of certain places, especially natural reserves. This instantaneity can serve also in other ways, like the development of early warning systems. This is capital in the fight against intrusive species. The Flemish equivalent of the IBGE has already sign conventions with the platform administrators to benefit from a special follow up of certain exotic species and their evolutions in certain areas of Flanders. Instantaneity – augmented with the development of a smartphone application Obsmap articulated to the platform – helps also in "reporting". Individuals can then notify live, with geo-referenced indications,

[8] We point that we did not engage in our research in a survey of users background and practices and we base these claims on the sayings of the platform's administrators – with all the limitations that this implicates.

the proper administrations of certain situations (e.g. dead animal body on the road). Finally this database offers precious information on the situation in terms of biodiversity of certain construction lots. This is in the interest of construction and real-estate professionals, especially architects. They can then anticipate, through conception and impact studies, potential regulatory oppositions to their construction permit by competent authorities.

Third, the site has undeniable impacts in terms of empowerment for activists and NGOs of nature protection. They can use the site's databases to back their arguments and contest institutional projects. This is the case for example in Ghent where, relying on these databases, NGOs brought strong arguments for their campaign against intensive agriculture, showing its impacts on the drastic reduction of the population of nesting birds. This is the case, paradoxically, also in Brussels, where the databases were used to counter in justice an IBGE project to set a children playground on a fringe of a terrain that the associations consider as a natural area to protect.

3 Conclusions

Crowdsourcing brings a revolution to the world of observation and monitoring by moving the centre of gravity of power equilibrium from the alliance of expertise and political institutions to the "masses" [9]. It does so by turning around the two principal limitations of the citizen sphere: its lack of credibility on scientific issues and its weak efficacy in the organization of large scale action.

By building a system of crediblization based mainly on peer review and learning, crowdsourcing deconstructs credibility and authority. In the situation of data scarcity, institutional and scientific elites were the only parties capable of validating and using effectively this information for large-scale action. This elite centralized power and drew top-down government modes of action that we know now the limits. With crowdsourcing, information is produced and diffused on large scale, and put at the disposition of "masses". In these "masses", profiting from abundant and omnipresent information as well as of the proximity between individuals and groups geographically scattered, thanks to Internet and Web 2.0, multiple networks of action are emerging around specific issues and logics of learning.

In the face of the scientific model of production of veracity based on the empiricism of laboratories, crowdsourcing advances a procedural model built through monitoring and the contribution of the "masses". The first marks the norm and the limit, allowing the validation of what is "true" and acceptable in a certain context. The second announces a continuous process of development that adapts continually the norm and the limit. As said by Hudson-Smith et al (2008) « *OSM like Wikipedia is a process of evolving a good product not a product in itself because there is no end goal in sight as to what constitutes the best map (or the best entry in the case of Wikipedia)* ». This reflexivity and the refusal to limit oneself to one meaning and one finality is the true power of crowdsourcing and its transformative potential.

Observations.be shows this well. The creation of the databases is an occasion here for reflexivity, learning and mobilisation. It is also an occasion of the liberation of the citizen, as an individual, form the straightjackets delimiting the institutional, scientific and associative

[9] We use here the words of Hudson-Smith et al (2008) and Boulos et al (2011) that speak of "mapping for the masses" when talking about neogeography.

spaces where he is just a subject, a collaborator or a member – always in a subordinate position. He becomes a peer producer, partner and discussant. More important, learning and action networks that develop in the platform cut transversally through the three spheres. We find unexpected and new cooperations between citizen, scientists and civil servants. Likewise, actions developed through the platform, mainly reporting, counting campaigns and early alert systems attest new modes of action that transgress the functional and ontological division of the three spheres.

As said Latour (1999, 2005) the redefinition of the world – nature and society – through participatory description is one of the best ways to democratically transform our institutions. Hence, with crowdsourcing observation and monitoring are living a change of paradigm. They are no more just a technical and methodological scientific tools. They are not also tools for centralization of power. It is a pural and democratic mode of power reconstruction.

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